

# Naval Research Laboratory

Washington, DC 20375-5320



NRL/MR/6130--01-8540

## Command Naval Surface Atlantic Fleet (COMNAVSURFLANT) Soot Issue Ship Visit — USS *Hawes* (FFG-53) and USS *Guston Hall* (LSD-44)/USS *Tortuga* (LSD-46)

JOHN WEGAND

KEITH LUCAS

*Center for Corrosion Science and Engineering Branch  
Chemistry Division*

ANDREW SEELINGER 05M1

*Naval Sea Systems Command  
Arlington, VA*

LUKE DAVIS

EDGAR BELLINGER

*GEO-CENTERS, Inc.  
Newton Centre, MA*

March 26, 2001

Approved for public release; distribution is unlimited.

20010418116

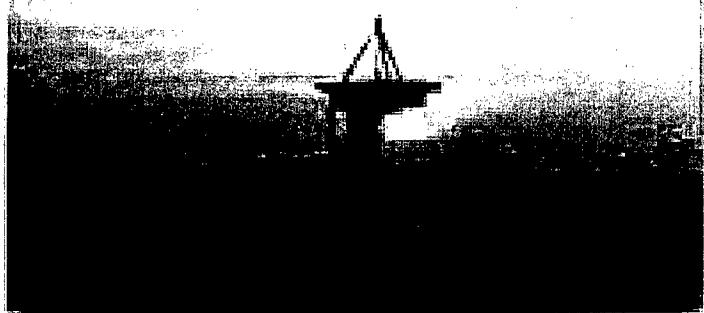
## **REPORT DOCUMENTATION PAGE**

*Form Approved*  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.



# COMMAND NAVAL SURFACE ATLANTIC FLEET (COMNAVSURFLANT) SOOT ISSUE SHIP VISIT - USS HAWES (FFG53) AND USS GUSTON HALL (LSD44) / USS TORTUGA (LSD46)



John Wegand 6136

Keith Lucas 6130

*Naval Research Laboratory  
Washington, DC*

Andrew Seelinger 05M1

*Naval Sea Systems Command  
Arlington, VA*

Luke Davis

Edgar Bellinger

*GEO-CENTERS, INC.  
Newton Centre, MA*

**Naval Research Laboratory**

Washington, DC \* Stennis Space Center, MS \* Monterey, CA





## CONTENTS

INTRODUCTION .....	1
ASSESSMENT .....	1
EVALUATION.....	4
AMPHIBS .....	4
CONCLUSION.....	5



## Command Naval Surface Force Atlantic Fleet (COMNAVSURFLANT) Soot Issue Ship Visit – USS HAWES (FFG53) and USS GUNSTON HALL (LSD44)/USS TORTUGA (LSD46)

---

### INTRODUCTION

A memorandum, dated 10 August 1999, was forwarded to NAVSEA 05N from COMNAVSURFLANT regarding diesel soot on certain class of ships, in particular frigates (FFGs) and certain “gators”—the issue being that the transition from black to gray color schemes in the stack and mast areas has resulted in the soot turning the gray paint black (increased sailor workload to remove soot). The memorandum requested a viable approach or cleaner be determined to assist ships force in the removal of the soot under SECNAV’s mission to support sailor workload reduction (Capital Investment for Labor Initiatives). Figure 1 depicts the soot problem of concern by COMNAVSURFLANT (CNSL).



Figure 1: A) The soot, even though prevalent on the stack, also adheres to the antennas, lighting fixtures, deck, etc. in the vicinity surrounding the diesel stacks on the USS HAWES. B) Running soot resulting from the diesel stacks on the USS GUNSTON HALL is quite apparent, even from a distance.

### ASSESSMENT

In March 2000, CNSL arranged a ship visit at Norfolk Naval Base for assessment of the aforementioned soot problem on the stacks by Naval Sea Systems Command (NAVSEA) 05M1 and the Naval Research Laboratory (NRL). Figure 2 shows close-ups of the soot adhering to the gray colored stacks on the USS HAWES.

Manuscript approved February 21, 2001.

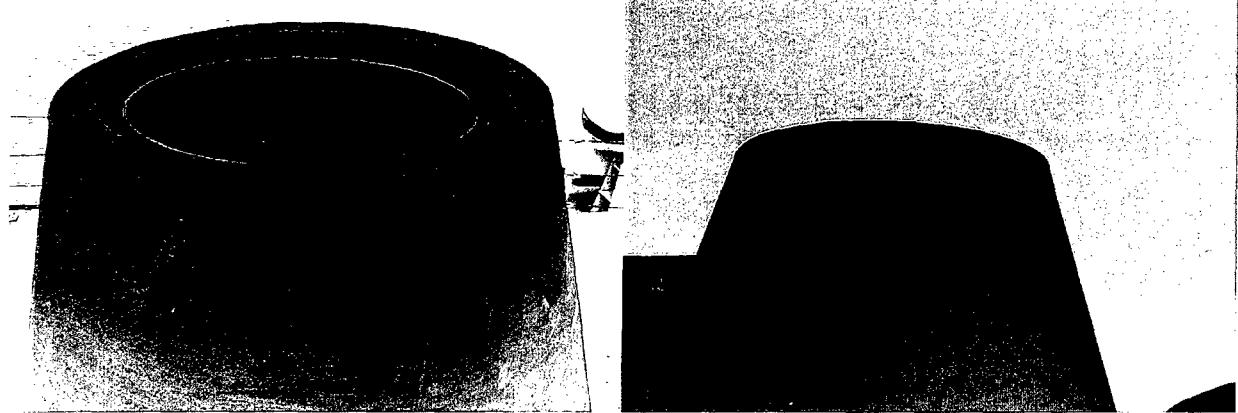


Figure 2: Even though heavier near the opening, soot completely coats the stack.

On 26 April 2000, A. Seelinger (NAVSEA 05M1), J. Wegand (NRL Code 6130) and E. Bellinger (NRL Code 6130 – GEO-CENTERS, INC.), under the guidance of CNSL representative, E. Hall, visited the USS HAWES (FFG53) to assess the soot issue. During the visit, three commonly available cleaners were evaluated for removal of the soot from the brush metallic finish on the stack—Fantastik All-Purpose Cleaner (sprayed then wiped with paper towel), Liquid Chimney Cleaner (sprayed then wiped with paper towel), and isopropyl alcohol (wetted paper towel then wiped). Isopropyl removed the soot from the stack area the best; unfortunately, pouring the cleaner on the wipe is inconvenient and wasteful. Fantastik worked well in removing the soot; Liquid Chimney did not work as well as the others. Figure 3 is a side-by-side comparison of the cleaners—isopropyl, Liquid Chimney, then Fantastik (left to right respectively).



Figure 3: Isopropyl alcohol, far left, removed the soot faster and better than Fantastik and Liquid Chimney.

It was apparent during the ship visit of the USS HAWES that the soot problem was not limited to the stacks only. The air-borne soot flowed to layer radar antennas, near-by lighting fixtures/wires, the non-skid deck surface, as well as general surfaces (ladders, etc.). Figures 4 through 6 show some of these other areas layered with soot from the diesel stacks.

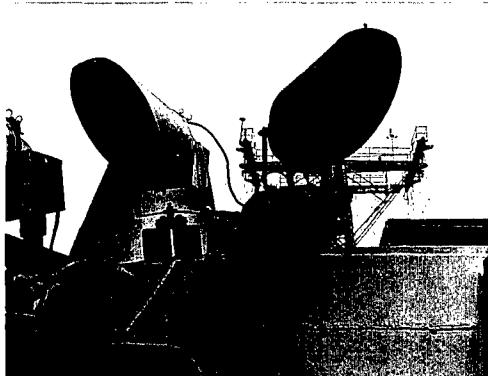


Figure 4: The area in close vicinity has a layer of soot causing discoloring.



Figure 5: The cleaning procedures for the composite material protecting the tracking radar system are addressed within a Navy specification requiring SIMPLE GREEN cleaner.

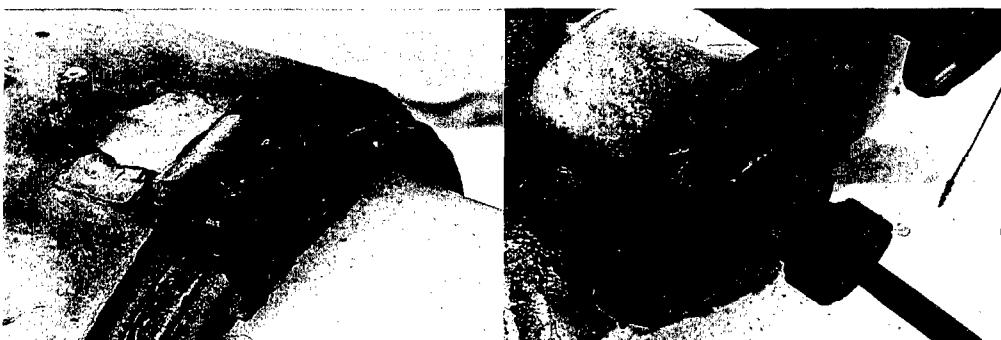


Figure 6: The lighting fixtures and wiring to the lighting have significant coating of soot.

In conversations with the ships force of the USS HAWES, removal of the soot from the various surfaces is usually performed at sea. Most areas are cleaned, especially the non-skid, using a high-pressure fire hose to wash the soot overboard—the tracking antenna (Figure 5)



is cleaned using Simple Green as defined within NSTM specification. Per ships force, the pressure wash approach is effective in removing the soot. The drawbacks per the USS HAWES are the lack of deck drainage and deck flatness with the FFG design—this may not be relevant on another class of ship. Another drawback is that it has to be done at sea due to the concern regarding overboard discharge (environmental).

## EVALUATION

An evaluation of the aforementioned cleaners was also performed on a flat, top coated region behind the lighting fixtures beside the diesel stack (see Figure 4). The cleaners removed the soot, but also seemed to remove a chalky layer of the paint—untreated area wiped resulted in a smeared gray, as well as black soot, coloring on the towel.

Based on conversations with the CNSL representative, it was unclear if the focus of the soot issue was limited to the stacks solely, or the stacks and surrounding vicinity. If the stacks are of sole concern, a commercially available cleaner, e.g. Fantastik or Formula 409, would assist in removal of the soot; the process is still labor intensive and the soot problem will return. If the deck area were included, then a pressure wash system, possibly with an environmentally compliant detergent, may be effective; this does not overcome the drainage or the effluent discharge in port issues. Another approach to resolving the soot issue may be a filtration system on the stack—an additional maintenance activity and a possible hazardous waste issue.

## AMPHIBS

To further assess the CNSL comment regarding paint color and soot, ship visits were completed on 6 June 2000 at Little Creek, Naval Amphibious Base (Norfolk, VA) to USS GUNSTON HALL (LPD44) & USS TORTUGA (LPD46). The issue regarding the change from black to gray paint at the top of the stacks, causing the soot to be more prevalent, was explored. Figure 7 compares the gray stack of USS GUNSTON HALL to the blacktopped stack of USS TORTUGA.

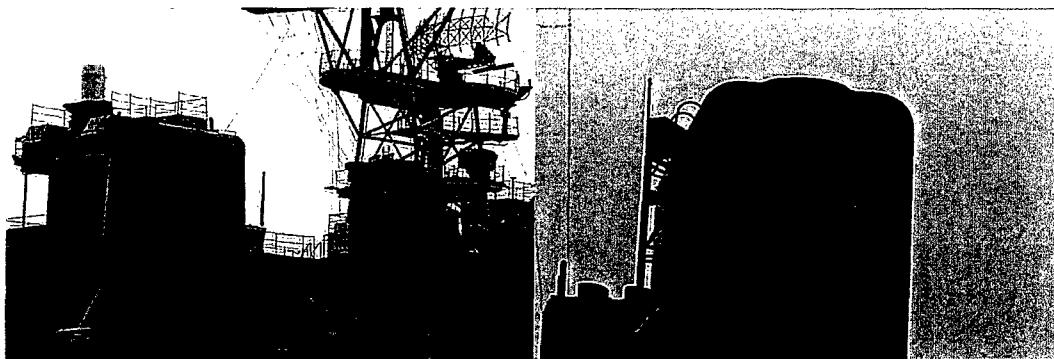


Figure 7: The change from black (right, USS TORTUGA) to gray (left, USS GUNSTON HALL) paint at the top of the stacks does not seem to enhance the soot problem—the soot covers more than just the top of the stacks.



The issue regarding soot removal was discussed with ships force of the USS TORTUGA. The BMC stated that power washers, with & without power-scrub heads, have been employed with some success. Personnel have also been suspended to remove soot by hand from various areas (see Figure 8). Generally, the ship resolves the soot problem by adding another layer of topcoat.

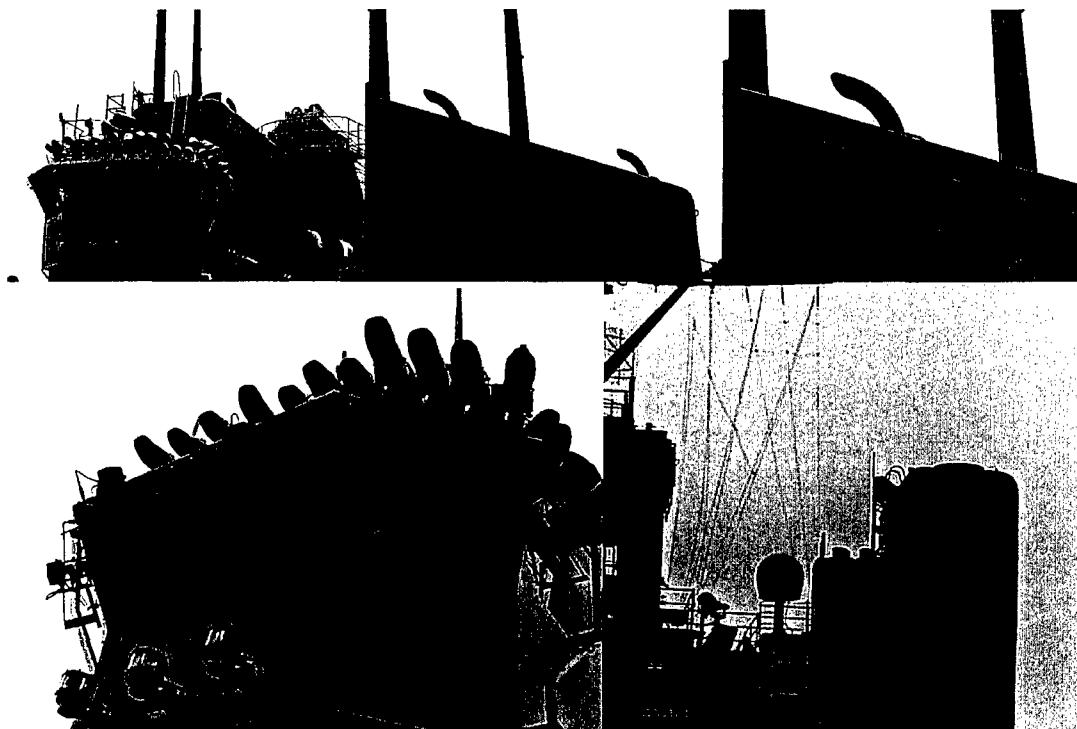


Figure 8: The soot on the amphibious ships covers significant amount of area near the stack.

## CONCLUSION

CNSL's concern regarding soot resulting from the exhaust of the diesel stacks is not trivial due to the extent of soot coverage. Possible recommendations from the assessment of the soot issue could be:

- a. Salt water wash down with firemain (high pressure) then thoroughly rinsed with freshwater, or pressure wash solely with freshwater, prior to entering port or while at-sea;
- b. Spot cleaning with a spray cleaner, e.g. Fantastik, Formula 409, or Simple Green—labor intensive and possible environmental/safety concern;
- c. Coating system that does not allow soot to easily settle and/or adhere—most attractive approach (investigation needed to determine feasibility).



**DEPARTMENT OF THE NAVY**  
**NAVAL RESEARCH LABORATORY**  
**4555 OVERLOOK AVE SW**  
**WASHINGTON D C 20375-5320**

**IN REPLY REFER TO:**

11 April 2001  
5211-286:CA

From: Kathy Parrish, Head, Publications Services Section  
To: Distribution  
Subj: ERRATA: NRL/MR/6130--01-8540, by John Wegand, Keith Lucas, Andrew Seelinger, Luke Davis, and Edgar Bellinger, dated March 26, 2001.

1. On the Cover the word Atlantic was spelled incorrectly. It should be Atlantic, not Atlanctic.
2. Attached please find the replacement Cover, with the correct spelling of the word.
3. We regret any inconvenience.

*Kathleen Parrish*  
Kathleen Parrish

A388739  
20010418116